

## Concrete Construction Engineering Handbook Second Edition

This book is focused on the theoretical and practical design of reinforced concrete beams, columns and frame structures. It is based on an analytical approach of designing normal reinforced concrete structural elements that are compatible with most international design rules, including for instance the European design rules – Eurocode 2 – for reinforced concrete structures. The book tries to distinguish between what belongs to the structural design philosophy of such structural elements (related to strength of materials arguments) and what belongs to the design rule aspects associated with specific characteristic data (for the material or loading parameters). A previous book, entitled Reinforced Concrete Beams, Columns and Frames – Mechanics and Design, deals with the fundamental aspects of the mechanics and design of reinforced concrete in general, both related to the Serviceability Limit State (SLS) and the Ultimate Limit State (ULS), whereas the current book deals with more advanced ULS aspects, along with instability and second-order analysis aspects. Some recent research results including the use of non-local mechanics are also presented. This book is aimed at Masters-level students, engineers, researchers and teachers in the field of reinforced concrete design. Most of the books in this area are very practical or code-oriented, whereas this book is more theoretically based, using rigorous mathematics and mechanics tools. Contents 1. Advanced Design at Ultimate Limit State (ULS). 2. Slender Compression Members – Mechanics and Design. 3. Approximate Analysis Methods. Appendix 1. Cardano's Method. Appendix 2. Steel Reinforcement Table. About the Authors Jostein Hellesland has been Professor of Structural Mechanics at the University of Oslo, Norway since January 1988. His contribution to the field of stability has been recognized and magnified by many high-quality papers in famous international journals such as Engineering Structures, Thin-Walled Structures, Journal of Constructional Steel Research and Journal of Structural Engineering. Noël Challamel is Professor in Civil Engineering at UBS, University of South Brittany in France and chairman of the EMI-ASCE Stability committee. His contributions mainly concern the dynamics, stability and inelastic behavior of structural components, with special emphasis on Continuum Damage Mechanics (more than 70 publications in International peer-reviewed journals). Charles Casandjian was formerly Associate Professor at INSA (French National Institute of Applied Sciences), Rennes, France and the chairman of the course on reinforced concrete design. He has published work on the mechanics of concrete and is also involved in creating a web experience for teaching reinforced concrete design – BA-CORTEX. Christophe Lanos is Professor in Civil Engineering at the University of Rennes 1 in France. He has mainly published work on the mechanics of concrete, as well as other related subjects. He is also involved in creating a web experience for teaching reinforced concrete design – BA-CORTEX.

Illustrates the Global Relevance of SustainabilityApplicable to roads, bridges, and other elements of the infrastructure, Green Building with Concrete: Sustainable Design and Construction, Second Edition provides an overview of all available information on the role of concrete in green building. A handbook offering viewpoints from worldwide experts

Reinforced Concrete Design: A Practical Approach, 2E is the only Canadian textbook which covers the design of reinforced concrete structural members in accordance with the CSA Standard A23.3-04 Design of Concrete Structures, including its 2005, 2007, and 2009 amendments, and the National Building Code of Canada 2010. Reinforced Concrete Design: A Practical Approach covers key topics for curriculum of undergraduate reinforced concrete design courses, and it is a useful learning resource for the students and a practical reference for design engineers. Since its original release in 2005 the book has been well received by readers from Canadian universities, colleges, and design offices. The authors have been commended for a simple and practical approach to the subject by students and course instructors. The book contains numerous design examples solved in a step-by-step format. The second edition is going to be available exclusively in hard cover version, and colours have been used to embellish the content and illustrations. This edition contains a new chapter on the design of two-way slabs and numerous revisions of the original manuscript. Design of two-way slabs is a challenging topic for engineering students and young engineers. The authors have made an effort to give a practical design perspective to this topic, and have focused on analysis and design approaches that are widely used in structural engineering practice. The topics include design of two-way slabs for flexure, shear, and deflection control. Comprehensive revisions were made to Chapter 4 to reflect the changes contained in the 2009 amendment to CSA A23.3-04. Chapters 6 and 7 have been revised to correct an oversight related to the transverse reinforcement spacing requirements in the previous edition of the book. Chapter 8 includes a new design example on slender columns and a few additional problems. Several errors and omissions (both text and illustrations) have also been corrected. More than 300 pages of the original book have been revised in this edition. Several supplements are included on the book web site. Readers will get time-limited access to the new column design software BPA COLUMN, which can generate column interaction diagrams for rectangular and circular columns of variable dimensions and reinforcement amount. Additional supplements include spreadsheets related to foundation design and column load take down, and a few Power Point presentations showcasing reinforced concrete structures under construction and in completed form. Instructors will have an access to additional web site, which contains electronic version of the Instructor's Solution Manual with complete solutions to the end-of-chapter problems, and Power Point presentations containing all illustrations from the book. The book is a collaborative effort between an academic and a practising engineer and reflects their unique perspectives on the subject. Svetlana Brzev, Ph.D., P.Eng. is a faculty at the Civil Engineering Department of the British Columbia Institute of Technology, Burnaby, BC. She has over 25 years of combined teaching, research, and consulting experience related to structural design and rehabilitation of concrete and masonry structures, including buildings, municipal, and industrial facilities. John Pao, MEng, PEng, Struct.Eng, is the President of Bogdonov Pao Associates Ltd. of Vancouver, BC, and BPA Group of Companies with offices in Seattle and Los Angeles. Mr. Pao has extensive consulting experience related to design of reinforced concrete buildings, including high-rise residential and office buildings, shopping centers, parking garages, and institutional buildings.

First published in 1995, the award-winning Civil Engineering Handbook soon became known as the field's definitive reference. To retain its standing as a complete, authoritative resource, the editors have incorporated into this edition the many changes in techniques, tools, and materials that over the last seven years have found their way into civil engineering research and practice. The Civil Engineering Handbook, Second Edition is more comprehensive than ever. You'll find new, updated, and expanded coverage in every section. In fact, more than 1/3 of the handbook is new or substantially revised. In particular you'll find increased focus on computing reflecting the rapid advances in computer technology that has revolutionized many aspects of civil engineering. You'll use it as a survey of the field, you'll use it to explore a particular subject, but most of all you'll use The Civil Engineering Handbook to answer the problems, questions, and conundrums you encounter in practice.

This revised, fully updated second edition covers the analysis, design, and construction of reinforced concrete structures from a real-world perspective. It examines different reinforced concrete elements such as slabs, beams, columns, foundations, basement and retaining walls and pre-stressed concrete incorporating the most up-to-date edition of the American Concrete Institute Code (ACI 318-14) requirements for the design of concrete structures. It includes a chapter on metric system in reinforced concrete design and construction. A new chapter on the design of formworks has been added which is of great value to students in the construction engineering programs along with practicing engineers and architects. This second edition also includes a new appendix with color images illustrating various concrete construction practices, and well-designed buildings. The ACI 318-14 constitutes the most extensive reorganization of the code in the past 40 years. References to the various sections of the ACI 318-14 are provided throughout the book to facilitate its use by students and professionals. Aimed at architecture, building construction, and undergraduate engineering students, the scope of concepts in this volume emphasize

simplified and practical methods in the analysis and design of reinforced concrete. This is distinct from advanced, graduate engineering texts, where treatment of the subject centers around the theoretical and mathematical aspects of design. As in the first edition, this book adopts a step-by-step approach to solving analysis and design problems in reinforced concrete. Using a highly graphical and interactive approach in its use of detailed images and self-experimentation exercises, "Concrete Structures, Second Edition," is tailored to the most practical questions and fundamental concepts of design of structures in reinforced concrete. The text stands as an ideal learning resource for civil engineering, building construction, and architecture students as well as a valuable reference for concrete structural design professionals in practice.

First Published in 1999: The Bridge Engineering Handbook is a unique, comprehensive, and state-of-the-art reference work and resource book covering the major areas of bridge engineering with the theme "bridge to the 21st century."

With the emphasis on visual aspects by including numerous charts, tables, and illustrations, this handbook presents practical information on oil and foundation engineering. A distinguished team of engineers takes the reader step by step through site development, soil mechanics, and foundation design analysis and construction techniques. New material is added on grouting foundation repair, forensic investigations, and residential and light construction procedures. 750 illus.

Corrosion of reinforcing steel is now recognized as the major cause of degradation of concrete structures in many parts of the world. Despite this, infrastructure expenditure is being unreasonably decreased by sequestration and the incredible shrinking discretionary budget. All components of our infrastructure including highways, airports, water supply, waste treatment, energy supply, and power generation require significant investment and are subjected to degradation by corrosion, which significantly reduces the service life, reliability, functionality of structures and equipment, and safety. Corrosion of Steel in Concrete Structures provides a comprehensive review of the subject, in addition to recent advances in research and technological developments, from reinforcing materials to measurement techniques and modelling. This book contains not only all the important aspects in the field of corrosion of steel reinforced concrete but also discusses new topics and future trends. Part One of the book tackles theoretical concepts of corrosion of steel in concrete structures. The second part moves on to analyse the variety of reinforcing materials and concrete, including stainless steel and galvanized steel. Part Three covers measurements and evaluations, such as electrochemical techniques and acoustic emission. Part Four reviews protection and maintenance methods, whilst the final section analyses modelling, latest developments and future trends in the field. The book is essential reading for researchers, practitioners and engineers who are involved in materials characterisation and corrosion of steel in concrete structures. Provides comprehensive coverage on a broad range of topics related to the corrosion of steel bars in concrete Discusses the latest measuring methods and advanced modeling techniques Reviews the range of reinforcing materials and types of concrete

From China to Kuala Lumpur to Dubai to downtown New York, amazing buildings and unusual structures create attention with the uniqueness of their design. While attractive to developers and investors, the safe and economic design and construction of reinforced concrete buildings can sometimes be problematic. Advanced Materials and Techniques for Rein

Developments in the Formulation and Reinforcement of Concrete, Second Edition, presents the latest developments on topics covered in the first edition. In addition, it includes new chapters on supplementary cementitious materials, mass concrete, the sustainability of concrete, service life prediction, limestone cements, the corrosion of steel in concrete, alkali-aggregate reactions, and concrete as a multiscale material. The book's chapters introduce the reader to some of the most important issues facing today's concrete industry. With its distinguished editor and international team of contributors, users will find this to be a must-have reference for civil and structural engineers. Summarizes a wealth of recent research on structural concrete, including material microstructure, concrete types, and variation and construction techniques Emphasizes concrete mixture design and applications in civil and structural engineering Reviews modern concrete materials and novel construction systems, such as the precast industry and structures requiring high-performance concrete

A PRACTICAL GUIDE TO REINFORCED CONCRETE STRUCTURE ANALYSIS AND DESIGN Reinforced Concrete Structures explains the underlying principles of reinforced concrete design and covers the analysis, design, and detailing requirements in the 2008 American Concrete Institute (ACI) Building Code Requirements for Structural Concrete and Commentary and the 2009 International Code Council (ICC) International Building Code (IBC). This authoritative resource discusses reinforced concrete members and provides techniques for sizing the cross section, calculating the required amount of reinforcement, and detailing the reinforcement. Design procedures and flowcharts guide you through code requirements, and worked-out examples demonstrate the proper application of the design provisions. **COVERAGE INCLUDES:** Mechanics of reinforced concrete Material properties of concrete and reinforcing steel Considerations for analysis and design of reinforced concrete structures Requirements for strength and serviceability Principles of the strength design method Design and detailing requirements for beams, one-way slabs, two-way slabs, columns, walls, and foundations

A new edition of a well-known and respected book. This book provides a thorough guide for structural engineers on the use of concrete masonry. The second edition of the Concrete Masonry Designer's Handbook is the only handbook to provide information on all the new CEN TC125 masonry standards, as well as detailed guidance on design to Eurocode 6. Th

The first edition of this comprehensive work quickly filled the need for an in-depth handbook on concrete construction engineering and technology. Living up to the standard set by its bestselling predecessor, this second edition of the Concrete Construction Engineering Handbook covers the entire range of issues pertaining to the construction Building with precast concrete elements is one of the most innovative forms of construction. This book serves as an introduction to this topic, including examples, and thus supplies all the information necessary for conceptual and detailed design.

Timber, steel, and concrete are common engineering materials used in structural design. Material choice depends upon the type of structure, availability of material, and the preference of the designer. The design practices the code requirements of each material are very different. In this updated edition, the elemental designs of individual components of each material are presented, together with theory of structures essential for the design. Numerous examples of complete structural designs have been included. A comprehensive database comprising materials properties, section

properties, specifications, and design aids, has been included to make this essential reading.

This is the first book on Engineered Cementitious Composites (ECC), an advanced concrete material attracting world-wide attention in both the academic community and in industry. The book presents a comprehensive coverage of the material design methodology, processing methodology, mechanical and durability properties, smart functions, and application case studies. It combines effective use of illustrations, graphical data, and tables. It de-emphasizes mathematics in favor of physical understanding. The book serves as an introduction to the subject matter, or as a reference to those conducting research in ECC. It will also be valuable to engineers who need to quickly search for relevant information in a single comprehensive text.

Considering how structures interact with soil, and building proper foundations, is vital to ensuring public safety and to the longevity of buildings. Understanding the strength and compressibility of subsurface soil is essential to the foundation engineer. The Foundation Engineering Handbook, Second Edition provides the fundamentals of foundation engineering needed by professional engineers and engineering students. It presents both classical and state-of-the-art design and analysis techniques for earthen structures and examines the principles and design methods of foundation engineering needed for design of building foundations, embankments, and earth retaining structures. It covers basic soil mechanics, and soil and groundwater modeling concepts, along with the latest research results. What's New in the Second Edition: Adds alternative analytical techniques to nearly every chapter Supplements existing material with new content Includes additional applications in the state of the art such as unsaturated soil mechanics, analysis of transient flow through soils, deep foundation construction monitoring based on thermal integrity profiling, and updated ground remediation techniques Covers reliability-based design and LRFD (load resistance factor design) concepts not addressed in most foundation engineering texts Provides more than 500 illustrations and over 1,300 equations The text serves as an ideal resource for practicing foundation and geotechnical engineers, as well as a supplemental textbook for both undergraduate and graduate levels.

Methods and practices for constructing sophisticated prestressed concrete structures. Construction of Prestressed Concrete Structures, Second Edition, provides the engineer or construction contractor with a complete guide to the design and construction of modern, high-quality concrete structures. This highly practicable new edition of Ben C. Gerwick's classic guide is expanded and almost entirely rewritten to reflect the dramatic developments in materials and techniques that have occurred over the past two decades. The first of the book's two sections deals with materials and techniques for prestressed concrete, including the latest recipes for high-strength and durable concrete mixes, new reinforcing materials and their placement patterns, modern prestressing systems, and special techniques such as lightweight concrete and composite construction. The second section covers application to buildings; bridges; pilings; and marine structures, including offshore platforms, floating structures, tanks, and containments. Special subjects such as cracking and corrosion, repair and strengthening of existing structures, and construction in remote areas are presented in the final chapters. For engineers and construction contractors involved in any type of prestressed concrete construction, this book enables the effective implementation of advanced structural concepts and their economical and reliable translation into practice.

"The book includes an extended appendix of monograms and tables using the new load factors, strength reduction factors, and limit strains design procedures mandated by the new ACI 318-05 code. Comprehensive sketches and sets of working drawings, end-of-chapter problems, pictures of actual structural tests to failure, and flowcharts appear throughout the book."--BOOK JACKET.

The Most Complete and Up-to-Date Resource on Forensic Structural Engineering Thoroughly revised and featuring contributions from leading experts, this definitive handbook offers comprehensive treatment of forensic structural engineering and expert witness delivery. From exploring the possible origins of errors, through investigating and analyzing failures, to working with the legal profession for assigning responsibilities, Forensic Structural Engineering Handbook, Second Edition covers every important topic in the field. The design and construction process Design and construction safety codes, standards, and regulations Standard of care and duty to perform First steps and legal concerns after a failure Engineering investigation of failures Origins and causes of failures Loads and hazards Design errors, construction defects, and project miscommunication Defects, deterioration, and durability Mechanisms and analyses of failures in steel, concrete, masonry, timber, and temporary structures; building envelope; and structural foundations Litigation and dispute resolution The expert consultant and witness

Over 140 experts, 14 countries, and 89 chapters are represented in the second edition of the Bridge Engineering Handbook. This extensive collection provides detailed information on bridge engineering, and thoroughly explains the concepts and practical applications surrounding the subject, and also highlights bridges from around the world. Published

Whether or not, you are on the job site or back in the office, this book will help you to avoid mistakes, code violations, and wasted time and money. The book's four part treatment begins with constituent materials followed by self contained parts on Concrete Properties, Processes, and Concrete Repair and Rehabilitation. Designed to be an "all in one" reference, the author includes a wealth information for the most popular types of testing. This includes: Analysis of Fresh Concrete; Testing Machines; Accelerated Testing Methods; Analysis of Hardened Concrete and Mortar; Core Sampling and Testing; Assessment of Concrete Construction ; Repair; Quality Concepts; Quality Control; Statistics; Standards, Specifications, and Codes of Practice. With this book in hand, construction engineers and even technicians find valuable information regarding Exposed Concrete Finishes, Repairing Concrete, Formwork, Precast Concrete, Concrete Roads, and Industrial Floors. Project managers and owners will find this reference a valuable guide to concrete both in terms of its applications in construction projects and the science and chemistry of concrete for its own sake. Fundamentals of Concrete Chemistry Handy at your figure tip calculations Tips for working with all types of concretes Covers Roads, floors, and finishes Principles of Precast, Reinforced and Prestressed Concrete

Until recently, much of the development of building materials has predominantly focused on producing cheaper, stronger and more durable construction materials. More recently attention has been given to the environmental issues in manufacturing, using, disposing and recycling of construction materials. Sustainability of construction materials brings together a wealth of recent research on the subject. The first part of the book gives a comprehensive and detailed analysis of the sustainability of the following building materials: aggregates; timber, wood and bamboo; vegetable fibres; masonry; cement, concrete and cement replacement materials; metals and alloys; glass; and engineered wood products. A final group of chapters cover the use of waste tyre rubber in civil engineering works, the durability of sustainable construction materials and nanotechnologies for sustainable construction. With its distinguished editor and international team of contributors, Sustainability of construction materials is a standard reference for anyone involved in the construction and civil engineering industries with an interest in the highly important topic of sustainability. Provides a comprehensive and detailed analysis of the sustainability of a variety of construction materials ranging from wood and bamboo to cement and concrete Assesses the durability of sustainable construction materials including the utilisation of waste tyre rubber and vegetable fibres Collates a wealth of recent research including relevant case studies as well as an investigation into future trends

Over 140 experts, 14 countries, and 89 chapters are represented in the second edition of the Bridge Engineering Handbook. This extensive collection highlights bridge engineering specimens from around the world, contains detailed information on bridge engineering, and thoroughly explains the concepts and practical applications surrounding the subject. Published in five books: Fundamentals, Superstructure

Design, Substructure Design, Seismic Design, and Construction and Maintenance, this new edition provides numerous worked-out examples that give readers step-by-step design procedures, includes contributions by leading experts from around the world in their respective areas of bridge engineering, contains 26 completely new chapters, and updates most other chapters. It offers design concepts, specifications, and practice, as well as the various types of bridges. The text includes over 2,500 tables, charts, illustrations, and photos. The book covers new, innovative and traditional methods and practices; explores rehabilitation, retrofit, and maintenance; and examines seismic design and building materials. The fifth book, Construction and Maintenance contains 19 chapters, and covers the practical issues of bridge structures. What's New in the Second Edition: Includes nine new chapters: Steel Bridge Fabrication, Cable-Supported Bridge Construction, Accelerated Bridge Construction, Bridge Management Using Pontis and Improved Concepts, Bridge Maintenance, Bridge Health Monitoring, Nondestructive Evaluation Methods for Bridge Elements, Life-Cycle Performance Analysis and Optimization, and Bridge Construction Methods Rewrites the Bridge Construction Inspection chapter and retitles it as: Bridge Construction Supervision and Inspection Expands and rewrites the Maintenance Inspection and Rating chapter into three chapters: Bridge Inspection, Steel Bridge Evaluation and Rating, and Concrete Bridge Evaluation and Rating; and the Strengthening and Rehabilitation chapter into two chapters: Rehabilitation and Strengthening of Highway Bridge Superstructures, and Rehabilitation and Strengthening of Orthotropic Steel Bridge Decks This text is an ideal reference for practicing bridge engineers and consultants (design, construction, maintenance), and can also be used as a reference for students in bridge engineering courses.

Sets out basic theory for the behavior of reinforced concrete structural elements and structures in considerable depth. Emphasizes behavior at the ultimate load, and, in particular, aspects of the seismic design of reinforced concrete structures. Based on American practice, but also examines European practice.

This second edition of Precast Concrete Structures introduces the conceptual design ideas for the prefabrication of concrete structures and presents a number of worked examples that translate designs from BS 8110 to Eurocode EC2, before going into the detail of the design, manufacture, and construction of precast concrete multi-storey buildings. Detailed structural analysis of precast concrete and its use is provided and some details are presented of recent precast skeletal frames of up to forty storeys. The theory is supported by numerous worked examples to Eurocodes and European Product Standards for precast reinforced and prestressed concrete elements, composite construction, joints and connections and frame stability, together with extensive specifications for precast concrete structures. The book is extensively illustrated with over 500 photographs and line drawings.

Eco-efficient concrete is a comprehensive guide to the characteristics and environmental performance of key concrete types. Part one discusses the eco-efficiency and life cycle assessment of Portland cement concrete, before part two goes on to consider concrete with supplementary cementitious materials (SCMs). Concrete with non-reactive wastes is the focus of part three, including municipal solid waste incinerator (MSWI) concrete, and concrete with polymeric, construction and demolition wastes (CDW). An eco-efficient approach to concrete carbonation is also reviewed, followed by an investigation in part four of future alternative binders and the use of nano and biotech in concrete production. With its distinguished editors and international team of expert contributors, Eco-efficient concrete is a technical guide for all professionals, researchers and academics currently or potentially involved in the design, manufacture and use of eco-efficient concrete. The first part of the book examines the eco-efficiency and life cycle assessment of Portland cement concrete Chapters in the second part of the book consider concrete with supplementary cementitious materials, including properties and performance Reviews the eco-efficient approach to concrete carbonation

Addressing the interactions between the different design and construction variables and techniques this book illustrates best practices for constructing economical, long life concrete pavements. The book proceeds in much the same way as a pavement construction project. First, different alternatives for concrete pavement solutions are outlined. The desired performance and behaviour parameters are identified. Next, appropriate materials are outlined and the most suitable concrete proportions determined. The design can be completed, and then the necessary construction steps for translating the design into a durable facility are carried out. Although the focus reflects highways as the most common application, special features of airport, industrial, and light duty pavements are also addressed. Use is made of modeling and performance tools such as HIPERPAV and LTPP to illustrate behavior and performance, along with some case studies. As concrete pavements are more complex than they seem, and the costs of mistakes or of over-design can be high, this is a valuable book for engineers in both the public and private sectors.

The third edition of this classic brings the most up-to-date information on all aspects of concrete technology and construction. Table of Contents: Section 1--Materials for Concrete; Section 2--Properties of Concrete; Section 3--Proportioning Mixtures and Testing; Section 4--Framework and Shoring; Section 5--Batching, Mixing and Transporting; Section 6--Placing Concrete; Section 7--Finishing and Curing; Section 8--Special Concrete and Techniques; Section 9--Advanced Building Construction Systems; Section 10--Specialized Practices; Section 11--Precast and Prestressed Concrete; Section 12--Architectural Concrete; Section 13--Repair of Concrete. Index.

Construction Engineering Calculations and Rules of Thumb begins with a brief, but rigorous, introduction to the mathematics behind the equations that is followed by self-contained chapters concerning applications for all aspects of construction engineering. Design examples with step-by-step solutions, along with a generous amount of tables, schematics, and calculations are provided to facilitate more accurate solutions through all phases of a project, from planning, through construction and completion. Includes easy-to-read and understand tables, schematics, and calculations Presents examples with step-by-step calculations in both US and SI metric units Provides users with an illustrated, easy-to-understand approach to equations and calculation methods

Continuing the tradition of the best-selling Handbook of Structural Engineering, this second edition is a comprehensive reference to the broad spectrum of structural engineering, encapsulating the theoretical, practical, and computational aspects of the field. The authors address a myriad of topics, covering both traditional and innovative approaches to analysis, design, and rehabilitation. The second edition has been expanded and reorganized to be more informative and cohesive. It also follows the developments that have emerged in the field since the previous edition, such as advanced analysis for structural design, performance-based design of earthquake-resistant structures, lifecycle evaluation and condition assessment of existing structures, the use of high-performance materials for construction, and design for safety. Additionally, the book includes numerous tables, charts, and equations, as well as extensive references, reading lists, and websites for further study or more in-depth information. Emphasizing practical applications and easy implementation, this text reflects the increasingly global nature of engineering, compiling the efforts of an international panel of experts from industry and academia. This is a necessity for anyone studying or practicing in the field of structural engineering. New to this edition Fundamental theories of structural dynamics Advanced analysis Wind and earthquake-resistant design Design of prestressed concrete, masonry, timber, and glass structures Properties, behavior, and use of high-performance steel, concrete, and fiber-reinforced polymers Semirigid frame structures Structural bracing Structural design for fire safety

This volume traces the process by which reinforced concrete emerged during the 19th century as the successful building material of today. Early work on testing the strength of cements led into a period of experimental work by a number of engineers, notably in Britain, France and America, to devise successful systems of embedding iron in concrete in such a way that the two materials would act together to carry imposed loads. The papers take the story to the early years of the 20th century and provide a thorough review of the gradual evolution of ideas and the contributions of individuals to this technology.

In Finite Element Design of Concrete Structures: practical problems and their solutions the author addresses this blind belief in computer results by offering a useful critique that important details are overlooked due to the flood of information from the output of computer calculations. Indeed, errors in the numerical model may lead in extreme cases to structural failures as the collapse of the so-called Sleipner platform has demonstrated.

Transport Properties of Concrete: Modelling the Durability of Structures, Second Edition, covers how to measure transport properties and use the results to model performance. The transport properties of concrete and measurements of the ability of ions and fluids to move through the material. These properties largely determine the durability of concrete and of steel embedded within it, as well as the effectiveness of structures such as waste containment barriers. The book provides a comprehensive examination of the subject and will be of use to all concerned with the durability and effectiveness of concrete structures. Includes a new chapter on modelling the durability of concrete structures showing how both diffusion and pressure driven flow should be included Covers the problems that occur when carrying out transport tests on concrete incorporating both traditional and newer cement replacements Shows how properties such as permeability which are needed for modelling may be derived from in situ tests on structures

The civil engineering sector accounts for a significant percentage of global material and energy consumption and is a major contributor of waste material. The ability to recycle and reuse concrete and demolition waste is critical to reducing environmental impacts in meeting national, regional and global environmental targets. Handbook of recycled concrete and demolition waste summarises key recent research in achieving these goals. Part one considers techniques for managing construction and demolition waste, including waste management plans, ways of estimating levels of waste, the types and optimal location of waste recycling plants and the economics of managing construction and demolition waste. Part two reviews key steps in handling construction and demolition waste. It begins with a comparison between conventional demolition and construction techniques before going on to discuss the preparation, refinement and quality control of concrete aggregates produced from waste. It concludes by assessing the mechanical properties, strength and durability of concrete made using recycled aggregates. Part three includes examples of the use of recycled aggregates in applications such as roads, pavements, high-performance concrete and alkali-activated or geopolymers cements. Finally, the book discusses environmental and safety issues such as the removal of gypsum, asbestos and alkali-silica reaction (ASR) concrete, as well as life-cycle analysis of concrete with recycled aggregates. Handbook of recycled concrete and demolition waste is a standard reference for all those involved in the civil engineering sector, as well as academic researchers in the field. Summarises key recent research in recycling and reusing concrete and demolition waste to reduce environmental impacts and meet national, regional and global environmental targets Considers techniques for managing construction and demolition waste, including waste management plans, ways of estimating levels of waste, the types and optimal location of waste recycling plants Reviews key steps in handling construction and demolition waste

This book details the latest information on the applied methods and techniques being used for quality control of concrete construction worldwide. The book forms the proceedings of the Second International Symposium on Quality Control on Concrete Structures, held in Belgium, June 1991.

This book describes how, given the global challenge of a shortage of natural resources in the 21st century, the recycling of waste concrete is one of the most important means of implementing sustainable construction development strategies. Firstly, the book presents key findings on the micro- and meso-structure of recycled aggregate concrete (RAC), while the second part focuses on the mechanical properties of RAC: the strength, elastic modulus, Poisson's ratio, stress-strain curve, etc. The third part of the book explores research on the durability of RAC: carbonization, chloride penetration, shrinkage and creep. It then presents key information on the mechanical behavior and seismic performance of RAC elements and structures: beams, columns, slabs, beam-column joints, and frames. Lastly, the book puts forward design guidelines for recycled aggregate concrete structures. Taken as a whole, the research results – based on a series of investigations the author has conducted on the mechanical properties, durability and structural performance of recycled aggregate concrete (RAC) over the past 10 years – demonstrate that, with proper design and construction, it is safe and feasible to utilize RAC structures in civil engineering applications. The book will greatly benefit researchers, postgraduates, and engineers in civil engineering with an interest in this field.

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